

ACMA5002 Coursework Feedback

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Selected topic/product/project: Injection-Moulded TPU Mobile Phone Housing

Final mark: 82/100

1. Engagement with Literature Skills — 12/15

The report uses a strong and relevant range of literature covering DFM, DFA, injection moulding, QFD, FMEA, DOE, simulation, material selection, sustainability and cost analysis. Recognised sources including Boothroyd and Dewhurst, Pugh, Malloy and recent journal and industrial references are used to explain the design and manufacturing decisions. Literature is generally integrated into the work rather than presented only as background, particularly in the discussions of gate location, ejection, material performance and recyclability. The report also uses Granta data appropriately to compare TPU and polycarbonate. Some sources are commercial or web-based, and several technical assumptions, particularly processing and economic values, would benefit from stronger standards-based or peer-reviewed support.

2. Knowledge and Understanding Skills — 25/30

The submission demonstrates very good understanding of DFM, DFA, injection moulding, polymer material behaviour and high-volume production. The CAD design applies uniform wall thickness, fillets, functional openings and 5° draft angles, and the discussion considers sprue dimensions, gate position and ejection requirements. The comparison of TPU and polycarbonate considers modulus, resilience, density, impact strength, price and production-related carbon emissions, leading to a reasoned selection of TPU. The report also demonstrates sound awareness of dimensional accuracy, moulding defects, tooling economics and sustainability. The main technical limitation is that the manufacturing route from raw-material preparation through moulding, trimming and quality inspection is not consolidated into a clear step-by-step process plan.

3. Cognitive and Intellectual Skills — 25/30

The report applies QFD, FMEA, DOE, simulation and economic analysis in a connected engineering process. The QFD identifies material performance, strength, snap-fit geometry, wall thickness and surface finish as design priorities. The FMEA includes initial and revised RPN values and shows substantial risk reduction for warpage, ejection damage and snap-fit failure. Four DOE conditions compare wall thickness, gate location and number of gates, leading to the selection of a 1 mm wall and a single central gate. The plastics results are interpreted in relation to filling, weld lines, sink marks and warpage, and these outcomes are linked to the final design. The analysis would be stronger with a clearer numerical results table for every DOE condition and more rigorous validation of the claim that the remaining warpage is within specification.

4. Practical Application Skills — 12/15

The submission demonstrates very good practical use of Fusion 360, Granta and engineering calculations. The CAD model includes the principal functional openings, filleted geometry, drafted features and a dimensioned engineering drawing. Gate locations are modelled and compared, while part volume, shot volume and sprue dimensions are calculated. The final plastics analysis reports complete filling, a 0.21-second fill time, very small predicted sink-mark depth, weld-line locations and warpage. FEA evidence includes safety-factor and displacement outputs and demonstrates the flexible response of the TPU housing during removal. However, the 1 N moment loading is only a limited operational test rather than a representative drop analysis, and the FEA setup, numerical stress result, mesh and constraints are not documented fully. More complete quantitative comparison of the design iterations would strengthen this criterion.

5. Transferable Skills for Life and Professional Practice — 8/10

The report is well structured and professionally presented, with an abstract, contents page, lists of figures, tables and equations, numbered sections, CAD illustrations, simulation outputs, calculations, discussion, recommendations and conclusion. The sequence from customer requirements through risk analysis, design development, material selection, validation, cost and sustainability is clear and coherent. Figures are generally readable and appropriately discussed, and the report communicates engineering trade-offs effectively. The main weaknesses are occasional grammatical and formatting errors and some calculation inconsistencies. For example, the material-cost calculation appears to use the component mass incorrectly, and the stated fill time differs between the simulation and costing sections. Careful checking of all numerical values would improve the professional reliability of the final report.

Mark summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	15	12
Knowledge and Understanding Skills	30	25
Cognitive and Intellectual Skills	30	25
Practical Application Skills	15	12
Transferable Skills for Life and Professional Practice	10	8
Total	100	82